

## Description

# INTERACTIVE THREE-DIMENSIONAL MULTIMEDIA I/O DEVICE FOR A COMPUTER

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a non-provisional application which claims the benefit of the commonly owned co-pending provisional application entitled "E.I.D. System," filed November 22, 2002, bearing U.S. Ser. No. 60/428,359 and naming Sandra Carr and Richard Geldbaugh, the named inventors herein, as sole inventors, the contents of which is specifically incorporated by reference herein in its entirety.

### BACKGROUND OF INVENTION

[0002] Technical Field

[0003] The present invention relates to computer input output (I/O) devices. In particular, it relates to a three-dimensional multimedia input output device for communi-

cation between a user and a computer. The device is three-dimensional, has motion capability, has audio output and input capability, and can be programmed to perform specific functions or entertainment activities related to communications between a computer and a user.

[0004] Background

[0005] Computers have become so prolific in modern society that they now may be considered to be almost in the category of common appliances. Not only does a substantial portion of the population have at least one computer, but also many individuals have several. Likewise, it is very difficult for most businesses to function without at least one computer. While most computers vary slightly from one another, they all tend to share similar methods of communicating between the computer and the user.

[0006] In a conventional computer system, output data is presented to a user primarily via a display screen and a printer. In addition, most operating systems which control computers use a variety of audio output signals of one kind or alert a user as to a specific condition such as the arrival of email, printer malfunctions, disk errors, etc. Likewise, attempts to allow users to communicate with computers by inputting voice commands and data has

now reached the point where voice input can now be effectively used. Other mechanical devices, such as a keyboard and a mouse also allow users to enter data. These communication methods allow users to enter data in a variety of manners. However, they do little to increase the enjoyment of using a computer, especially for young people and children. It would be desirable to have a method of interaction with computers that allows individuals to receive output data from a computer, and input data into a computer, which provides a more "human-like" experience for the user, and which may provide the user with some amusement and entertainment at the same time.

[0007] One application which most computer users take advantage of is the ability to communicate via email. In an effort to make email more efficient, a variety of methods have been used to notify the user when an email is received. For example, one system uses a small icon that appears on the computer screen to notify the user that email has arrived. Alternatively, audio alarms can also be used to notify the user. In the event that the user is not paying careful attention to the computer display screen, the notice icon may be easily missed. Likewise, if the user steps away from the computer momentarily, an audible alarm

may be missed. It would be desirable to have a method of notifying the user when email arrives which would be difficult for the user to miss and which would remain present for the user in the event the user steps away from the computer.

[0008] Another application commonly used by users on networks such as the Internet is the use of the computer to carry on conversations via chat rooms. This type of conversation typically is carried on in the form of text messages that are typed into the computer by the user, and which are displayed on a remote computer used by another user. This type of communication can be enjoyable, but it lacks the visual stimulus associated with interacting with another individual in person. It would be desirable to have a method of simulating the presence of others when engaging in activities such as online chats.

[0009] Another application has been the development of games in which an individual competes against a software opponent either in a local computer or across a network. As was the case, discussed above in regard to online chat rooms, it may be desirable to have an opponent as a physical presence rather than just an image on a display screen when playing a game against the computer.

[0010] Another computer application that has recently become especially popular is the use of games in which players can compete against one another from remote locations using sophisticated networks, such as the Internet. When individuals play games with one another in a non-computer environment, whether they are playing two player games or multi-player games, they typically have the benefit of enjoying reactions from their opponents during the course of play. Unfortunately, a disadvantage associated with computerized network's versions of games, which were heretofore played by individuals in the presence of one another, is that the individual players often find the games too impersonal because of the absence of the physical presence of their opponents. It would be desirable to have a method of simulating the presence of friends and opponents when playing games across computer networks.

[0011] While the prior art has provided numerous devices and methods for communicating between a computer and a computer user, it has failed to provide a method of communicating via multimedia data paths which use not only conventional methods of communication such as voice, but also use motion, such that in addition to moving data,

also provides a more human feel to enhance the user's experience.

## **SUMMARY OF INVENTION**

[0012] The present invention provides a multimedia I/O device for use with computers. The device acts as a three-dimensional multimedia device that provides audio input and output capability, and provides motion data output via a three-dimensional moving figure that uses motion to communicate with the user. It outputs audio messages to users via optional internal speakers, it detects user voice input through an optional internal microphone and inputs it to the computer, and it is also capable of causing the device to move, under software control, to catch the user's attention. The multimedia I/O device is formed in the shape of a selected character and can be formed using any suitable design, such as a human-like character, as a specific individual (e.g., a celebrity, a historical figure, an athlete, a theatrical character, etc.) as a non-human character such as an animal, as any other mythical or imaginary character, or as to any other suitable physical object or mechanical device.

[0013] When used by the computer to communicate with the user, it can be made to move, under software control, to

catch the user's attention in regard to the arrival of email or other events such as the occurrence of an unexpected hardware or software event that requires the user's attention and/or action. It can also be used to represent remote individuals when the user is in a chat room.

[0014] When used in conjunction with games, the device provides a personalized three-dimensional mechanical device that represents actual opponents located in remote computers on a network, or alternatively, represents a software opponent for use in single person games. Optionally, the multimedia I/O device may have voice recognition input to allow the user to enter commands or data into the system.

[0015] Another option provides for multiple multimedia I/O devices to be used simultaneously for multi-player games that are played by remotely located users. In addition to games played solely with multimedia I/O devices, it is also possible to use the multimedia I/O devices in conjunction with animated characters displayed on a computer monitor. An optional universal base allows multiple detachable characters attached to the base to be replaceable so that different characters can be substituted for different games, etc.

## **BRIEF DESCRIPTION OF DRAWINGS**

- [0016] Figure 1 illustrates a conventional prior art computer system.
- [0017] Figure 2 is a front view of a preferred embodiment of the multimedia I/O device that shows its attachment to a conventional computer system.
- [0018] Figure 3A is a side view of a preferred embodiment of the multimedia I/O device that is shown in the seated position.
- [0019] Figure 3B is a side view of a preferred embodiment of the multimedia I/O device that is shown in the standing position.
- [0020] Figure 5A illustrates a preferred embodiment of the invention in which the user inputs commands to the computer, which in response issues commands to multimedia I/O device.
- [0021] Figure 5B illustrates a wireless preferred embodiment of the invention in which the user inputs commands to the computer, which in turn instructs the multimedia I/O device to execute a specific function.
- [0022] Figure 5C illustrates a hard wired preferred embodiment in which the user inputs voice commands to the multimedia I/O device, which in turn communicates the voice data to the computer system.



- [0023] Figure 5D illustrates another preferred embodiment in which multiple wireless multimedia I/O devices are attached to a computer system for use in multi-player games.
- [0024] Figure 5E illustrates another preferred embodiment in which multiple wireless multimedia I/O devices are attached to each of a plurality of computer systems for use in multi-player games across a network such as the Internet.
- [0025] Figure 6 illustrates another alternative preferred embodiment in which the mechanical multimedia I/O device shown in the previous embodiments is replaced with a holographic I/O device.

#### **DETAILED DESCRIPTION**

- [0026] Prior to a detailed discussion of the figures, a general overview of the system will be presented. The invention provides a system that uses a multimedia I/O device that provides a novel method of communication between a computer and a computer user. An advantage of the multimedia I/O device is that it provides 1) the capability of communicating with the user via audio output, 2) the capability of communicating with the user via voice data input, 3) the capability of communicating with the user via

selected physical motion of the multimedia I/O device, and 4) the capability of coordinating audio and motion by the head and mouth of the multimedia I/O device to simulate speech. In one aspect, the multimedia I/O device provides for audio output, which may be in the form of specific sounds, and/or recorded voices. The recorded voices may even be prerecorded digital voice data, which uses the voices of the user, acquaintances of the user, celebrity voices, etc.

[0027] In addition to providing a means to output audio data, the multimedia I/O device may optionally provide a means to input voice data for processing by voice recognition software. The combination of audio output and voice data input provides a method of communication which is much more human in character than conventional methods of communication with computers, such as data display or printing. This is particularly enjoyable for activities such as gaming, conversations in chat rooms, instant messaging, etc. Further, the human-like feel and convenience of using voice communication between the computer and the user even improves mundane tasks such as receiving email, or saving notification of system events (e.g., printer out of paper, system errors, etc.).

[0028] In addition to the audio and voice aspects of the multimedia I/O device, the device also provides for a variety of ways to communicate data via motion. The multimedia I/O device includes a movable character. Mechanical animation under software control also allows the computer to communicate in a variety of manners.

[0029] Another advantage associated with the invention is that it can be used to conveniently notify user regardless of the user's location within a building. For example, if a computer is located in one room of a house, and the multimedia I/O device is wirelessly attached to the computer and located in another room, then the computer can activate the multimedia I/O device so that the user will be notified when email arrives even if the user is in another room. Having discussed the invention in general, we now turn to a more detailed discussion of the figures.

[0030] In figure 1, a conventional prior art computer system 1 is illustrated. This figure illustrates the normal array of devices used to communicate between the user and the computer. Namely, the processor 2 which controls a video display 3, and a printer 6 which are used for output. In addition, it also shows a keyboard 4 and a mouse 5. These basic I/O devices are used in virtually all comput-

ers. Unfortunately, there is a substantial drawback to this configuration in that the user must use these basic devices for all activities. In the case of socially oriented activities, such as those discussed above, the user is unable to communicate in a manner, which is more like communicating with another human rather than communicating with a conventional computer.

[0031] Figure 2 illustrates a preferred embodiment of the invention, which shows the multimedia I/O device 7 attached to a conventional computer system 1. In this figure, the multimedia I/O device 7 is mounted on the base unit 9 and is shown in a seated position. For ease of illustration, the base unit 9 is shown connected to a computer system 1 via a conventional cable 8. Those skilled in the art will recognize that while the base unit 9 and the computer system 1 can communicate via conventional hard wire cable such as cable 8, they can just as easily communicate with one another via a wireless connection. The implementation of wireless interface connections is well known in the art and need not be further discussed here.

[0032] While a wireless connection between the computer system 1 and base unit 9 is not critical, it provides a significant advantage over conventional cabling. In particular, a wire-

less interface between the base unit 9 and the computer system 1 allows the base unit 9 to be located anywhere in an office, building, or other facility. In the event that the multimedia I/O device 7 is intended to be used for notification of messages or for other activities, it can be placed away from the computer system 1 where the user is most likely to be present. As a result, when the user is waiting for an important message, the multimedia I/O device 7 can notify the user as soon as the message is received. In addition, it also allows the user to engage in two-way communication with the computer system 1 from a location, which is remote from the computer system 1. Wireless communications networks between components of a computer system, or multiple computer systems, is well known in the art and need not be explained further here.

[0033] A further advantage of a wireless connection is that multiple multimedia I/O devices 7 can be used by a single computer system 1 such that the computer system 1 can communicate with a variety of locations throughout a building. As a result, the user can install several multimedia I/O devices 7 and be able to communicate with the computer system 1, and receive messages, throughout an office or home.

[0034] Figure 2 also illustrates the multimedia I/O device 7 in the form of a human, or life-like device, sitting in a chair. In the preferred embodiment, the multimedia I/O device 7 and its associated base unit 9 are fabricated such that the multimedia I/O device 7 can be detached from the base unit 9. An advantage associated with the two-piece structure illustrated in this figure is that in the event that the multimedia I/O device 7 and base unit 9 were fabricated as a single piece device, this would limit the user's flexibility in terms of how the device is used. Instead, when the multimedia I/O device 7 is fabricated as a detachable unit, then multiple multimedia I/O devices 7 may be used in conjunction with the same base unit 9. This provides an advantage in that a multimedia I/O device 7 which is associated with a particular game character, with a particular user, or which represents any other type of figure, can be conveniently and less expensively used if the same base unit 9 can be reused.

[0035] The multimedia I/O device 7 can take the form of any suitable character. It can be a human figure, a celebrity, an action figure, an animal, or even a cartoon character (e.g., SpongeBob Squarepants (TM), the Tick (TM), etc.). The only requirement is that if multiple multimedia I/O

devices 7 are fabricated for use with a common base unit 9, they must have a common attachment point such that each figure used as a multimedia I/O device 7 can be detached to the base unit 9 in the same manner, and controlled by the base unit 9, in the same manner even though their outer appearance varies.

[0036] In the preferred embodiment, the computer system 1 communicates with the multimedia I/O device 7 via an Application Programming Interface ("API"). An API is the software interface that allows an application program to access the operating system, and other computer resources. Each API establishes a standard interface which allows application programs and/or system programs to access a particular system resource, such as the multimedia I/O device 7 or other devices. Of course, the API would take into account the unique features of any given device. APIs are well known in the art. In the preferred embodiment, an API defining a standard set of commands associated with particular multimedia I/O device 7 motions will allow any application program to issue instructions to the multimedia I/O device 7. For example, a sample set of commands may read: 1 = sit, 2 = stand, 3 = wave left arm, 4 = wave right arm, 5 = nod head up and down, 6 =

shake head back and forth, 7 = open mouth, 8 = close mouth, etc. The use of the API allows the multimedia I/O device 7 to be used by an application program without requiring detailed knowledge of the internal structure and design of the multimedia I/O device 7. This will allow application programs to be easily modified such that they can take advantage of the features and advantages of the multimedia I/O device 7.

[0037] When the multimedia I/O device 7 is integrated with the computer system 1, it can be used as part of a complete system in which any number of software applications (e.g., application programs such as games, Instant Messenger (TM), Excel (TM), WordPerfect (TM), MS Word (TM), etc.) in the computer system 1 may communicate with the user via an API that instructs the operating system to perform a variety actions in regard to the multimedia I/O device 7. The multimedia device 7 can be used to enhance the enjoyment of software applications through its use in combination with other actions taken by a computer program. By way of example, if a user were playing a game of computer chess, the chessboard would typically be displayed on the computer monitor. When the computer makes a move, the multimedia I/O device 7 could stand



up and announce the computer's move. Likewise, the user could input moves to the computer system 1 via the microphone 13. The multimedia I/O device 7 could also be used to output messages based on factors such as the length of time the user takes to respond, based on the effectiveness of a move, etc.

[0038] In addition to the control of the multimedia I/O device 7 via local application programs, as discussed above, an internet browser can also use an API to allow a remote user to control operation of a local multimedia I/O device 7.

[0039] In figure 3A, a side view of a preferred embodiment of the multimedia I/O device 7 and base unit 9 is shown. In this figure, the character represented by the multimedia I/O device 7 is shown in a seated position. In the preferred embodiment, the seat 10 is an intricate part of the base unit 9. However, the seat 10 may also be detachable from the base unit 9. Because it is detachable, it can take any form, which matches a desired character type. For example, if the multimedia I/O device 7 is made to resemble a particular type of character, such as a king, a queen, etc., then the seat 10, or base unit 9, can be fabricated such that it resembles a throne. This format is useful for board games like chess. For example, while the chessboard is

displayed on the video screen, the multimedia I/O device 7 could be used to provide animated commentary and remarks, which would enhance the game of chess by making it more humorous. This approach can be used in combination with any number of games.

[0040] For a character such as that represented in this figure, a seated position would typically be used when the device was not communicating with the user. During communication, the character may be sitting or standing.

[0041] In regard to figure 3B, this figure shows the preferred embodiment illustrated in figure 3A with the multimedia I/O device 7 moved to the standing position. In addition, the multimedia I/O device 7 is also shown with the device's arm 11 in the raised position. As can be seen, the motion capability the multimedia I/O device 7 is not limited to merely sitting or standing up. It can also be made to move one or both arms 11 so that it can emphasize a message and provide more entertainment value. Likewise, the head 14 can also be made to rotate the sideways direction (i.e., silently indicating "no"), or tilt (i.e., nod in agreement). Preferably, the motion of the multimedia I/O device 7 is coordinated with audio output to better simulate real speech. This type of motion allows the multimedia I/O de-

vice 7 to present a more natural and more human feel, and further enhances the interaction experience.

[0042] This figure also illustrates optional audio output and input features of the invention. For ease of illustration, output speaker 12 is shown located on the side of seat 10. However, those skilled in the art will recognize that the output speaker 12 can be placed in any convenient location. In addition to the audio output speaker 12, this figure also illustrates microphone 13, which is used for inputting voice data from the user. It is also shown mounted in seat 10. From a manufacturing viewpoint, if seat 10 is detachable from base unit 9, then it would be more convenient to have the speaker 12 and the microphone 13 mounted in the base unit 9, below. Of course, those skilled in the art will recognize that while it is possible to mount the audio output speaker 12, and the microphone 13, in the multimedia I/O device 7, they will also realize that this approach will result in a more complicated design.

[0043] Figure 4 is a side cut away view of a preferred embodiment of the invention. In this figure, the general overview of the mechanical linkages within the multimedia I/O device 7 is shown. In addition, the linkage 19 between multimedia I/O device 7 and base unit 9 is shown along with

the circuitry 20 which controls mechanical operation of the multimedia I/O device 7 and the microphone 13 and audio output speaker 12 which are located in seat 10.

[0044] In this figure, motion control elements 15 thru 18 of the multimedia device 7 are illustrated. For ease of discussion, the various motion control elements 15 thru 18 include mechanical rods 15, which provide the structural support for multimedia I/O device 7 (they are joined together at control points 16). Control points 16 can be any suitable multimedia rod control point. In addition, tilt rod 17 is shown detached to a control point 16 inside of head 14. The mechanical linkages within the multimedia I/O device 7 allow tilt rod 17 to tilt the head 14 so that the head 14 appears to be nodding. Likewise, rotational control rod 18 is attached to the mechanical linkages of the multimedia I/O device 7 and the head 14 so that when rotational control rod 18 is rotated, the head rotates left and right (i.e., indicating "no"), or up and down (i.e., indicating "yes"). Further, it is also possible to provide mechanical control of an optional moving mouth 31 component. This allows the audio output to be coordinated with movement of the head 14 and the moving mouth 31 to provide a more realistic simulation of speech.

[0045] Mechanical linkages required to move structural elements of the multimedia I/O device, such as the arms, legs, and head, are well known and the art and will not be discussed in further detail herein. While a single linkage connection between the multimedia I/O device 7 and the base unit 9 is preferred for simplicity, those skilled in the art will recognize that it is also possible to have other linkages when the multimedia I/O devices 7 are in the sitting position. In addition, the multimedia I/O device 7 can be motor driven or powered by alternate means of moving the mechanical components, such as through the use of a pneumatic drive system. The device can also be powered by any convenient method, such as battery power, or via a hardwired power source. Likewise, it can be controlled wirelessly with no physical linkage between it and the base unit 9.

[0046] The linkage between the multimedia I/O device 7 and the base unit 9 can take any suitable form, such as mechanical linkage, pneumatic linkage, or electrical connections (which provide control signals and possibly power to drive motors inside the multimedia I/O device 7). However, in the preferred embodiment, whichever linkage is used should have a standard configuration such that a variety of multimedia I/O devices 7 can be interchangeably used

with a standard base unit 9. With this in mind, the preferred embodiment that uses integral motors inside the multimedia I/O device 7 allows the multimedia I/O device 7 to be attached to the base unit 9 via a single electrical signal and/or power connector.

[0047] The linkage between the multimedia I/O device 7 and base unit 9 is made through the bottom of the feet of the multimedia I/O device 7 such that they remain out of sight and do not detract from the appearance of the device. When attached to the base unit 9, the linkages that extend from the bottom of the feet of the multimedia I/O device 7 are inserted into a mechanical control device 19, which manipulates the various rods required to move the various elements of the multimedia I/O device 7. An advantage provided by attaching linkages through the bottom of the feet is that they allow the multimedia I/O device 7 to be controlled in the same manner whether the multimedia I/O device 7 is standing or sitting. Mechanical and pneumatic linkages for controlling moving parts are well known in the art and need not be discussed in further detail here.

[0048] This figure illustrates the fact that the seat 10 can be integrated with the base unit 9 so that it is a single device.

Also shown in this figure is the control circuitry 20, which communicates with the mechanical control device 19 via cable 23. In addition, control circuitry 20 also outputs data via cable 21 to audio output speaker 12, and inputs received voice data from microphone 13 via cable 22.

While control circuitry 20 can be configured with the cable to connect with a computer system 1, this embodiment uses a transmitter that is part of the control circuitry 20 to communicate with computer system 1. The transmitter provides a wireless link by transmitting signals 24 to a receiver and the computer system 1. Power supply 25 is attached to the control circuitry. It receives power from an input power line 26 and is connected to control circuitry 20 that in turn provides power to the mechanical control device 19.

[0049] Any suitable power source can be used to power a multimedia I/O device 7. In the case of a locally attached base unit 9, a hardwired source of power will likely be more convenient. Likewise, a multimedia I/O device 7, or base unit 9, which is wirelessly connected to a remote computer system 1 may benefit from a battery power supply.

[0050] If the multimedia I/O device 7 is designed to be replaceably attached to the base unit 9 such that a variety of dif-

ferent multimedia I/O devices 7 may be selectively attached to a base unit 9, then it is important that the method of attachment to base unit 9 and mechanical linkages and control elements have the standard configuration to facilitate the interchange of multimedia I/O devices 7.

[0051] In figure 5A, a preferred embodiment of the invention is shown in which the user 27 inputs commands to the computer system 1. In response to the user's 27 input, the computer software determines what response should be made by the multimedia I/O device 7. The computer system 1 communicates the response to the base unit 9, which commands the multimedia I/O device 7 to perform an action.

[0052] Figure 5B illustrates a wireless preferred embodiment of the invention in which the user 27 inputs data to the computer system 1. In response to the user's 27 input, the computer system 1 communicates output data and commands to the multimedia I/O device 7. The multimedia I/O device 7 can output audio data to the user or execute a specific command which would initiate a specific type of motion, such as standing up, sitting down, nodding the head to indicate "yes," moving the head sideways to indi-



cate "no," waving and arm, etc. Of course, combining several functions makes the multimedia I/O device 7 even more interesting. For example, it can output audio data while standing up and moving its head up or down, etc.

[0053] Figure 5C illustrates a hard-wired preferred embodiment in which the user inputs voice commands or voice data to the microphone input 13 in the multimedia I/O device 7. The multimedia I/O device 7 transfers the voice data to the computer system 1. The computer system 1 then uses voice recognition software to determine what action to take. Voice recognition technology is well known in the art, and is available from a variety of commercial sources. Therefore, it will not be discussed in further detail herein.

[0054] Figure 5D illustrates another preferred embodiment in which multiple wireless multimedia I/O devices 7 are attached to a computer system 1 for use in multi-player games, or for use by other tasks. When multi-player games are played, they can be played between the user 27 and a software program in the computer system 1, or alternatively, each multimedia I/O device 7 can represent a player on a remote computer 1 located somewhere on a network such as the Internet. As the remotely located player enters commands, and possibly voice data, those

commands and voice data can be transmitted via the network to the local computer 1 where the multimedia I/O device 7 communicates with the local user 27 in a variety of ways, including speaking, moving, and listening for input from the local user 27. Of course, the local user 27 would prefer to be able to respond to the remote user in the same manner.

[0055] In figure 5E, another alternative embodiment of the invention is shown. In this embodiment, the local user 27 is playing the game with two other users 27, each located at a remote user location. Each of the computer systems 1 can communicate with the other computers via the Internet 30. As a result, the computers can be located anywhere. In addition, each computer system 1 has a remote I/O device 7 for each one of the users 27 playing the game. For ease of illustration, three computer systems 1 are shown, with each having three multimedia I/O devices 7 that represent the user at each of the computer systems 1. In this embodiment, the software on one computer system 1 can issue instructions to a remote computer regarding the multimedia I/O device 7 attached to that remote computer system 1. For example, in this figure the user 27 at remote user computer system, identified as

computer "n" in the figure, can issue a command which will make the multimedia I/O device 7 on the local user's computer system 1 stand up and raise its arm. As discussed above, the user 27 can enter commands in a variety of ways, including using the microphone 13 and voice recognition software.

[0056] An optional feature of the invention allows a local user 27 at a local computer system 1 to input commands and voice data to a multimedia I/O device 7 at a remote computer 1. The user 27 can instruct a local computer system 1 to transfer that user's 27 commands and voice data to a remote computer system 1. Then, the local user's 27 commands will be executed by the remote computer 1, and the local user's 27 voice will be played through the speaker 12 on the remote user's computer system 1. As a result, when playing a game, a local user 27 not only can have one of the remote multimedia I/O devices 7 stand up and make a variety of motions, but it can also speak to the remote user 27 in the actual voice of the local user 27 when transmitting the message. This adds a very human feature to the games and greatly enhances the entertainment value and enjoyment of the games. Of course, in addition to games, this feature can also be used for any

number of other activities. For example, it can be very enjoyable when used in chat rooms or when used with instant messaging systems, emails, etc. Further, the ability to remotely control a multimedia I/O device 7 can greatly enhance the enjoyment value of the game or other user activity.

[0057] The communication technique provided by this invention allows a user 27 to communicate directly with a computer system 1 in the same manner that the user 27 would communicate with another individual. The computer system 1 can simultaneously output information in several modes, using audio to provide specific data, and motion to help the interpretation of that data due to the conveyance of information that can alter the meaning of the specific audio data (e.g., emotional emphasis, indications of urgency, etc.). In addition, communication via motion also provides entertainment value that is not possible with mere audio data. Further, the addition of voice input via the microphone 13 allows simultaneous two-way communication between the computer system 1 and the user 27.

[0058] It should also be noted that while the computer system 1 would normally control the motion of the multimedia I/O device 7, the user 27 could also control the motion of the

multimedia I/O device 7 by inputting commands, which the computer system 1 would then use to move the multimedia I/O device 7. These commands can be input by the user 27 as audio data via the microphone 13 (or any other microphone attached to the computer), or as instructions that are manually input via a conventional device such as a keyboard 4 or a mouse 5.

[0059] The multimedia I/O device 7 can be used as an I/O device for a question-and-answer session with the user 27, or to facilitate dictation by the user 27. For example, the user 27 can answer a series of questions output by the multimedia I/O device 7. The answers to those questions can then be input from the multimedia I/O device 7 to the computer system 1. Likewise, a multimedia I/O device 7 can be used as an audio dictation input device. The multimedia I/O device 7 can also be used to instruct the computer system 1 to display a message on the computer system 1 monitor. Since the multimedia I/O device 7 can be remotely located (via hard wired or wireless connection) from the computer system 1, the ability to control data transfer between the computer system 1 and the user 27 with the multimedia I/O device 7 provides the user with the ability to control the computer system 1 from any

location in the building, office, or home.

[0060] As discussed above, the multimedia I/O device 7 can be made to resemble any number of human, animal, or other characters to suit a particular user's tastes or a particular task. Another advantage of removable multimedia I/O devices 7 is that they can be fabricated such that they are related to a particular theme (e.g., movies, cartoons, etc.). For example, in the Christmas season the multimedia I/O device 7 can be fabricated such that it resembles Santa Claus, a snowman, a reindeer, etc. In fact, multimedia I/O devices 7 can be fabricated for any holiday or special event (e.g. birthdays). Likewise, the multimedia I/O device 7 can be fabricated such that it resembles characters from movies or the theater. For example, the characters can represent action figure from movies such as StarWars (TM), the Hulk (TM) etc.

[0061] In addition to physical appearance, the control circuit 20 can also incorporate a voice module which is either permanently attached, removable in the form of cartridge, or programmably changeable. The voice module can contain data related to specific games, and/or it can have specific voices, such as celebrity voices. It can also incorporate a variety of tones for certain words to convey more than one

meaning. In the event that replaceable multimedia I/O devices 7 are used, it is also possible to incorporate identification technology in the multimedia I/O device 7. In particular, a simple device such as a radio frequency identification device ("RFID") tag can be incorporated into the multimedia I/O device 7. In addition, the base unit 9 can have an RFID tag detector/reader to read the RFID tag in the multimedia I/O device 7. By identifying the specific type of multimedia I/O device 7 which is being attached to the base unit 9, the computer system 1 can automatically select a particular voice file which corresponds to a particular voice, and then use that selected voice with the selected multimedia I/O device 7 which is being currently replaceably attached to the base unit 9. As a result, the voice for a particular multimedia I/O device 7 can be automatically replaced with no action required on the part of the user 27.

[0062] In addition to the uses discussed above, the multimedia I/O device 27 can be used for a variety of other functions. For example, it can be remotely attached to computer system 1, which uses timing software to activate the multimedia I/O device 7 such that, if placed in a bedroom, it will act as an alarm clock. For that matter, it can be incor-

porated directly into an alarm clock so long as the alarm clock has sufficient intelligence to drive the multimedia I/O device 7. In addition to acting as an alarm clock, it can also provide an entertaining way to remind individuals that it is time to take medication. Another application of multimedia I/O device 7 is its use to notify users 27 who are users of bidding or auction systems. For example, Internet applications such as eBay (TM) use specific deadlines for making bids. The computer system 1 can automatically activate the multimedia I/O device 7 to remind individuals that the auction is ready to expire. Likewise, the multimedia I/O device 7 can be used for any number of other applications, such as reminding parents about tasks related to their children, or reminding owners about tasks related to their pets, etc.

[0063] Another preferred embodiment, which was not heretofore discussed, is the embodiment in which a multimedia I/O device 7 incorporates all features of the base unit 9 and acts as a stand-alone device which communicates directly with the computer 1 without an intervening base unit 9. Those skilled in the art will recognize that the stand-alone embodiment of the invention can be used as a local unit attached via a cable to the local computer 1, or can be re-



motely located away from the computer 1 in another area of the building. In this embodiment, the multimedia I/O device 7 can be represented by any selected character. For example, a rabbit, dog, cat, or any other suitable animal figure can incorporate all of the features of the base unit 9 along with an integral battery power supply and a wireless transceiver. In this configuration, the figure can move in a much more unrestricted fashion since it is not limited by connection to a base unit 9. In addition, this configuration also allows a much more natural and life-like interface, which will provide a substantial amount of enjoyment and entertainment.

[0064] The three-dimensional shape and motion capability of the invention provides a substantial advantage over the prior art in that by its nature, a three-dimensional moving device is much more noticeable and provides a much more life-like feel. In addition, it provides a new method of communication between the user and the computer system 1. While prior art computers were generally restricted to audio or video methods of communication with a user, the invention provides a new method of communication. Namely, the invention allows the user and the computer to communicate via motion. Motion is much more noticeable

and more emphatic than traditional methods of human/computer communication. In addition, physical motion can be much more efficient in that not only can a simple gesture communicate a substantial amount of data, a gesture can also communicate a substantial amount of emotional information (e.g., humor, anger, sadness, etc.) in addition to just the factual data which is the primary type of information communicated by conventional computer I/O devices.

[0065] The previous discussions of wireless communications between the multimedia I/O device 7 and the computer 1 have focused on the use of wireless communications between the multimedia I/O device 7 which was relatively close to computer 1. However, those skilled in the art will recognize that the distance between the multimedia I/O device 7 and the computer 1, is only limited by the distance limitations of the particular communications link. With the advent of higher-powered wireless networks, the multimedia I/O device 7 does not even have to be in the same building as the computer 1. This is especially useful in the situation where multiple multimedia I/O devices 7 are attached to the same system and placed in various locations in a building, or even in more than one building.

In that situation, they can be used as a local communications system. For example, if the computer system is located in a den of a home, a first wireless multimedia I/O device 7 is located in the kitchen of the home, and a second wireless multimedia I/O device 7 is located in a child's bedroom, a mother can input voice data to the first multimedia I/O device 7 to instruct the computer system 1 to communicate with a child in a specific room. The computer system 1 will receive the mother's instructions, and then activate the second multimedia I/O device 7 to send a mother's message to the child. In addition, the computer system 1 can input a specific message in a mother's voice and then output the message to the second multimedia I/O device 7 located in the child's room. The second multimedia I/O device 7 can be commanded by the computer system 1 to make specific motions and to speak to the child in the mother's voice. This can even be done without the mother's intervention. For example, the computer 1 can be programmed to automatically notify a child when chores are to be done, when it is time to leave for school, when it is time to go to bed, etc. The mother can record a message now, and then instruct the computer system 1 to send the message to the child at a later time. In addition,

the mother can also instruct the computer system 1 to send the message on a recurring basis. An example of how this would work is as follows. The mother records a message telling the child to wake up and get ready for school. She then instructs the computer system 1 to send this message every weekday morning during the school year. As a result, the computer system 1 automatically sends messages on specific days for a specific purpose. This recurring message capability can be used for any number of activities, in addition to the alarm clock function discussed above.

[0066] For ease of illustration, the foregoing example used the home to illustrate how the multimedia I/O device 7 could convey information throughout a home, those skilled in the art will recognize that the advantages provided by remotely located multimedia I/O devices 7 could just as easily be provided for a commercial office environment. Therefore, it should be assumed throughout this specification that while a particular example may use a home environment or an office environment, the invention can in fact be used anywhere that computers are used, including homes, offices, schools, etc.

[0067] The computer system 1 can also be used to take voice

data input in the user's voice and translate it to a second voice. For example, if two remotely located users 27 are exchanging voice data, the computer system 1 can send the user's 27 actual voice to a remote system. However, using voice recognition software, the computer system 1 can determine which words are selected and then substitute a different voice from a voice module and send that voice to the remote system. This provides an entertaining novelty feature in that the user at the remote system will hear the local user's words spoken in a recognizable voice such as that of a mother, character, animal, or cartoon, celebrity, etc.

[0068] In the discussions related to the foregoing preferred embodiments, a variety of features, such as audio output or audio input, have been discussed such that they are an integral component of the invention. However, it should be understood that the use of motion as a communications technique can be successfully used without the need for audio output or input. Of course, the combination of motion communications with optional audio output and/or voice input will greatly enrich the effectiveness of the communications process, because a communication method which uses motion, audio output and voice input

is more consistent with communications between humans rather than communications between humans and a machine such as a computer system 1. As a result, this type of multimedia communication will be more enjoyable and comfortable for a user.

[0069] In addition to the fact that the speaker 12 and the microphone 13 can be optional, their locations are also optional. For ease of illustration, in the figures the speaker 12 and the microphone 13 were shown as integral components of the base unit 9 which may incorporate a seat 10, or have the seat 10 as a separate unit. Integrating the speaker 12 and the microphone 13 into the base unit 9 allows the multimedia I/O device 7 to be fabricated and marketed with all of the components included in a single convenient device. However, those skilled in the art will recognize that the speaker 12 and the microphone 13 can be placed in any suitable location. For example, they can be independent freestanding devices, they can be integrated into the computer system 1, they can be part of the multimedia I/O device 7, etc. Since the audio output and input is invisible to the user 27, their integration with the multimedia I/O device 7, the base unit 9, or the seat 10 is not required.

[0070] Figure 6 represents another alternative embodiment that replaces the mechanical multimedia I/O device 7 with a hologram 34 that is generated by the base unit 9. The advantage of a holographic I/O device 32 over a mechanical multimedia I/O device 7 is that the holographic I/O device 32 has an unlimited number of potential characters, and further, it does not have any moving parts to wear out or break.

[0071] In this figure, the base unit 9 includes a microphone 13 and a speaker 12 to allow the user 27 and the computer system 1 to engage in an audio conversation in the same manner as was done in the previous embodiments. Also shown in this figure is a transparent cover 33 and holographic projectors 35. The holographic projectors 35 project beams 36 which interact to create a three-dimensional hologram 34.

[0072] Those skilled in the art will recognize that use of a computer-generated hologram 34 provides the system the ability to produce an unlimited number of characters and images that will greatly enhance the enjoyment of the device. For example, while it is possible to select any number on pre-programmed characters into a database, it is also possible for the holographic I/O device 32 to be

combined with a camera system that will allow the local user's image to be projected by the holographic projectors 35 on the remote system. Likewise, the remote users can have their images presented on the local holographic I/O device 32. This provides an enormous benefit to users in that they can enjoy 3-D holographic images of friends and family in real time. This provides a substantial enhancement over prior art e-mail, instant messaging, and chat room software systems.

[0073] The system presented herein provides a unique combination of features that creates a new method of communicating between a user and a computer system. The system provides a multimedia I/O device that communicates with motion, with voice input, and with voice output. Further, it can also be used in conjunction with pre-existing I/O devices such as a display monitor, keyboard, or a mouse. It provides an interface which has a human-like feel and which even allows for the communication of emotional states, which was heretofore not available. It provides a method of substituting individual characters, which are represented by the multimedia I/O devices, by attaching the multimedia I/O devices to a universal base unit. It further allows this communication to be carried on remotely



from the computer via a wireless link, or through a network with interaction between remote users. The system is also intended to be used with a software interface, such as an API interface, which will allow it to be used by any application program in the computer.

[0074] While the invention has been described with respect to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in detail may be made therein without departing from the spirit, scope, and teaching of the invention. For example, the material used to construct the multimedia I/O device may be anything suitable for a particular type of character. The size and shape of the multimedia I/O device can vary. The type and number of multimedia I/O devices can vary, and can be mixed such that different characters can be used simultaneously. Any suitable type of multimedia drive mechanism can be used to move elements of the multimedia I/O device. For example, mechanical drives can be used, pneumatic drives can be used, and electronic drives with motors inside the multimedia I/O device can be used. Motor driven documents can be powered via electrical connections between the multimedia I/O device and base unit, or powered via batteries. Accordingly, the invention

herein disclosed is to be limited only as specified in the following claims.

[0075] We claim: